

THE EFFECT OF TRYPTOPHAN ON THE SOMATOTROPIC HORMONE
DURING SLEEP IN SCHIZOPHRENICS

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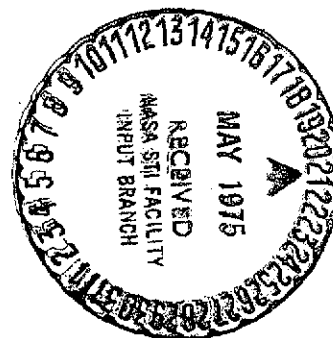
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16. Abstract An investigation is made to determine whether tryptophan administration during sleep is able to induce a release of the somatotrophic hormone in schizophrenic subjects.			
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THE EFFECT OF TRYPTOPHAN
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by

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The levels of the somatotrophic hormone (GH) fluctuate during the course of 24 hours having the greatest peak during sleep in strict agreement with stages III and IV (delta sleep) - (1-3). Such an approximately daily rhythm may be modified during daytime hours by various stimuli, among which the amino acids (4-6), which are able to provoke a lively response in the internal secretion of the GH. [1490*]

In the schizophrenic syndromes in the chronic phase, the hypnic structure is characterized by a frequent reduction in the delta sleep (7-10), and an accentuated decrease in it is often associated with the absence of the nocturnal peak in the GH (2).

This research was undertaken to investigate if the administration of tryptophan even during sleep is able to induce a release of the hormone, quantitatively changed, in schizophrenic subjects.

Material and method - The study has been conducted on four male subjects with schizophrenic syndromes in the chronic phase, who had recovered in the Neuropsychiatric Hospital in Aquila. The age is distributed between 40 and 46 years (mean 42.7) with a mean appearance of the disease at 21.3 years. The patients have been selected for homogeneity of the psychopathologic picture at the moment of the actual investigation, evaluated by means of the BPRS by Overall and Gorham (12).

After a placebo period of at least 30 days, four nocturnal polygraphic recordings were made. During the third night blood samples were taken on three subjects in order to determine the GH levels in the plasma approximately every 30 minutes, without disturbing the patient, with a technique described previously (11). Oral administration of L-tryptophan using a single dose of [1491]

*Translator's Note: Numbers in margin indicate pagination of original foreign text. [1]

100 mg/kg was then started and carried out 15 minutes before the patient went to bed. On the fifth day the last recording was made and samples were taken to determine the GH and total tryptophan rates in all the subjects.

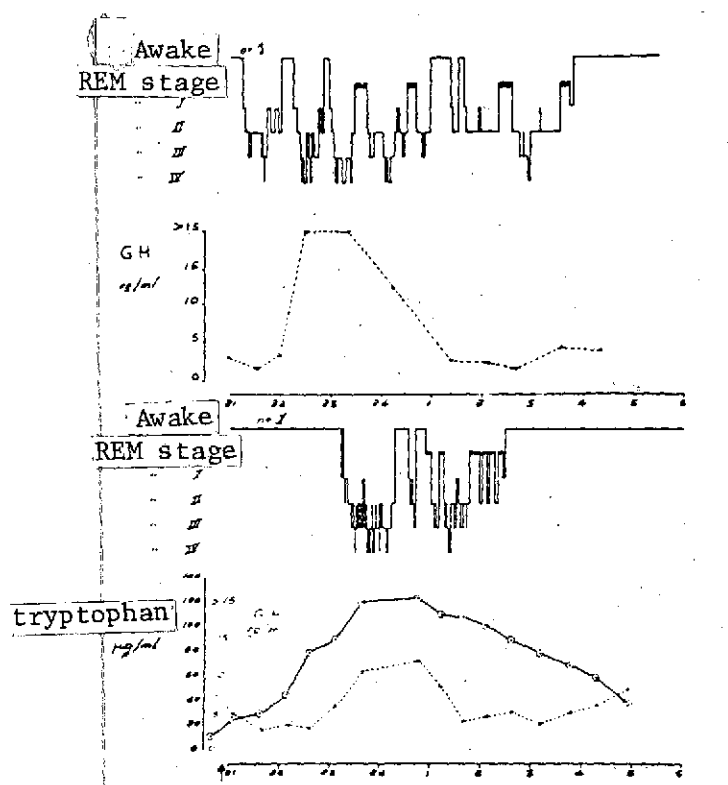
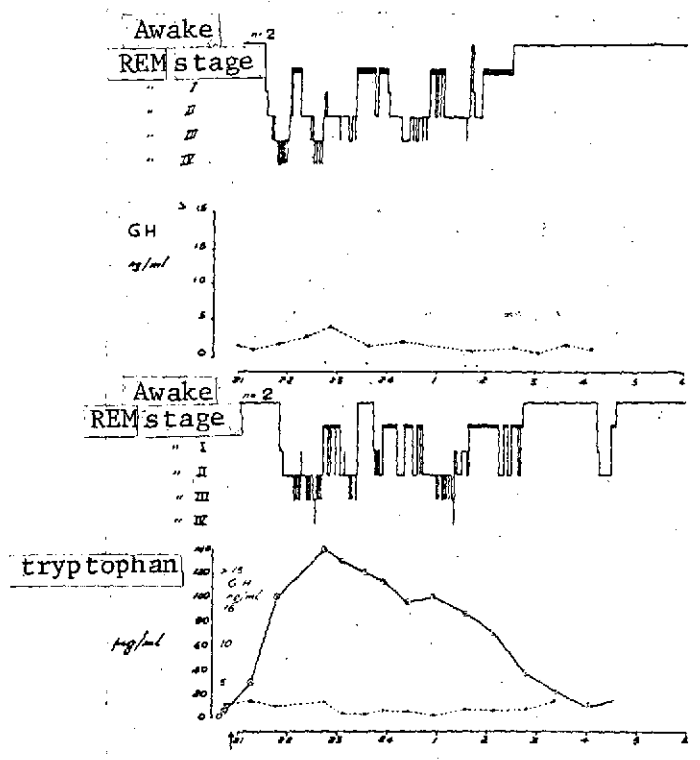


Fig 1. Hypnogram and GH plasma levels before and after the administration of tryptophan (indicated by the arrow). The GH levels are represented by the dotted line and the tryptophan levels by the solid line.

The evaluation of the plots has been carried out for periods of twenty seconds according to the criteria proposed by Rechtschaffen and Kales (13).

The GH levels have been evaluated with the radical-immunological method; and the tryptophan rate has been evaluated with the fluorometric method.

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Fig 2. See the title for Figure 1.

Results and discussion. The base sleep is characterized by a reduction in the sleeping time due to difficulty in going to sleep and frequent waking up and by a change in the hypnic structure by an accentuated decrease in stage IV. The administration of tryptophan generally produces an increase in the REM stage with a reduced latency of the eye REM without causing changes in the delta sleep; these results can be superimposed on what was obtained previously for another group of chronic schizophrenics. (14).

The GH plasma rate in base conditions shows a critical increase only in one case in conjunction with sufficient presence of delta sleep (Fig. 1). In the remaining two subjects (Fig. 2, 4) fluctuations were not observed in the somatotrophic level exceeding 5 ng/ml, and stage IV is hardly represented.

After the administration of the amino acid, one finds considerable differences in the maximum tryptophan levels in the blood (70-140 µg/ml) and in the absorption peak, which varies from 60 to 360 minutes after ingestion. The behavior of the GH remains unchanged after tryptophan in two cases and the respective quantity of the delta sleep is unchanged (Fig. 1, 2). Similarly, in subject number three one observes the absence of a peak in the hormone during sleep, but here the GH base levels are missing. Instead, there is a modest increase (8 ng/ml) in the somatotrophic rate in the

preceding wakeful period, a probable internal secretion response to the amino acid as it is found in normal subjects with 5-hydroxytryptophan (15).

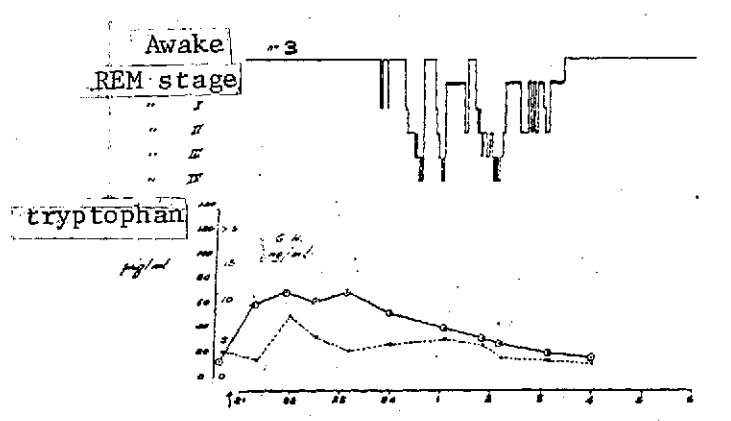


Fig.3. See the title for Figure 1.

Finally, in the last patient (Fig. 4) there appears a nocturnal GH peak only after tryptophan. Such an internal secretion can not be connected with the metabolic stimulus because of the considerable time which has passed from the ingestion of the amino acid to the release of the hormone; instead, there is a close connection with the only moment in the night in which there is stage IV delta sleep of a continuous, but not prolonged duration. It is not possible to establish if the slight increase in this stage depends on the tryptophan or other physical and mental factors, but it is evident that there is a connection between the delta sleep and the introduction into the cycle of the hormone, which has been displaced abnormally in the last part of the night because of a displacement in the delta sleep.

The results obtained thus show that administration of tryptophan does not directly influence the internal secretion of GH, which is dependent only on the presence of the delta sleep. The amino acid during sleep thus loses the characteristic of the internal secretion stimulus and, in particular, it does not seem like it is able to regulate the altered rhythm of some schizophrenics. This is additional confirmation that the nocturnal GH peak is spontaneous and is not correlated as during waking with a metabolic substrate, but is dependent upon a rhythmical mechanism, which appears during delta sleep.

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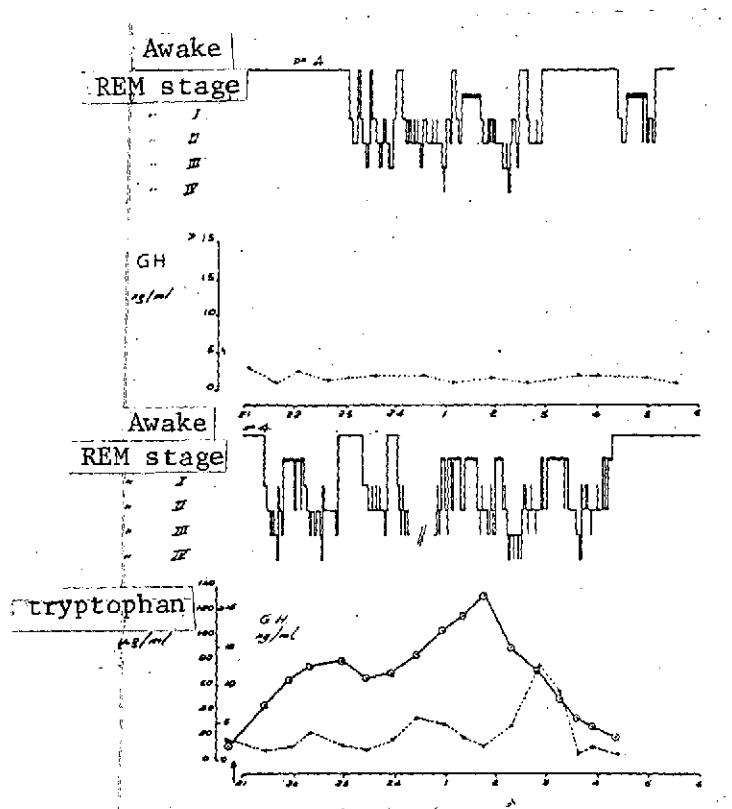


Fig. 4. See the title for Fig. 1.

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